

Final Year Project



NeuraSight

Anomaly detection for financial fraud

Group Members

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FYP GOALS & OBJECTIVES

01.

OVERVIEW

Useful for understanding the statistics of the dataset as well as future trends of transactions which helps in spotting temporal behaviours

02.

MOTIFS

Useful for detecting fraud tactics that involve specific sequences of transactions found in the data.

03.

GNN

The graph-based algorithm's 4 classes of models were trained on

EVALUATION FEEDBACK

Finding Neighbours of Motifs

Extended motif analysis by adding the ability for users to find neighbours of detected patterns



ITERATION 1

Work done till FYP-1 Mid



Research on Frauds



Static Motifs



UI Wireframe



Time Series Analysis



ITERATION 2

Work done till FYP-1 Final

01.

UI Implementation



02.

Temporal Motifs



03.

Custom Motif Drawing



ITERATION 3

Work done till FYP-2 Mid



GNN-1



UI Integration



Custom Motif Queries



Improved Motif Drawing



ITERATION 4

Work done till FYP-2 Final



GNN-II



Improving UI



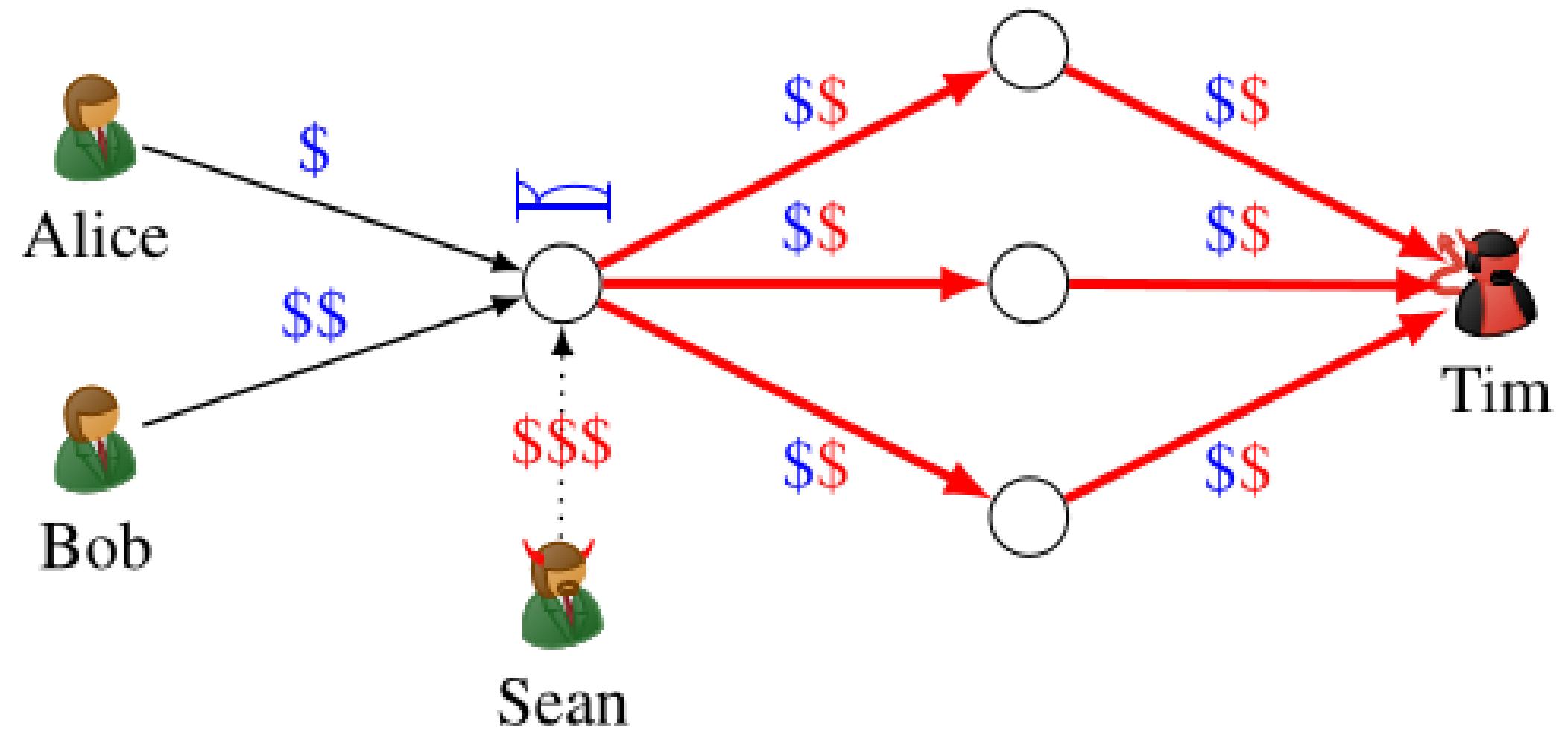
Fine Tuning Models



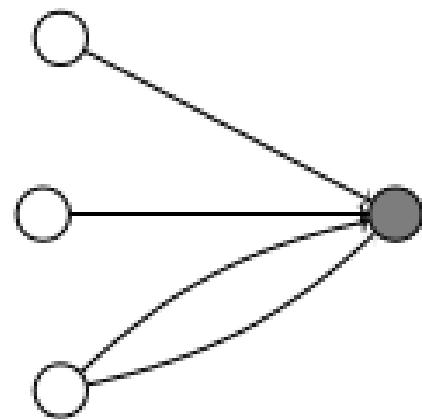
Motif Neighbourhood Analysis



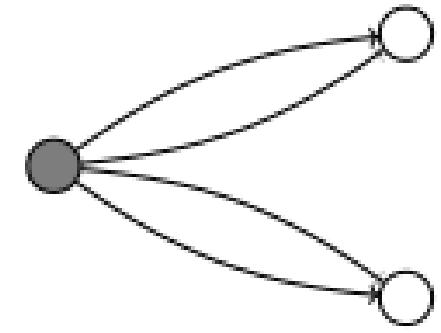
MOTIVATING EXAMPLE



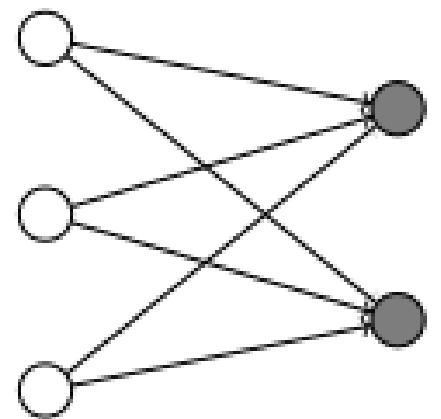
FINDING FRAUDULENT PATTERNS



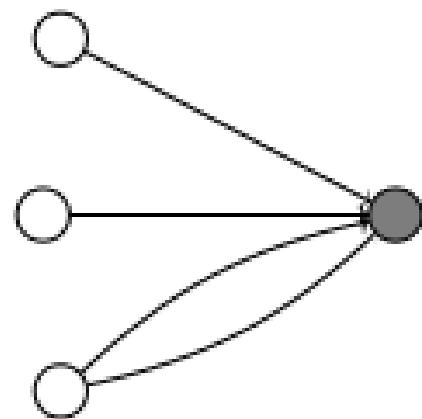
(a) Degree-in = 4



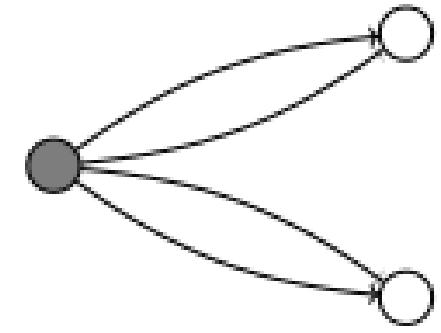
(b) Degree-out = 4



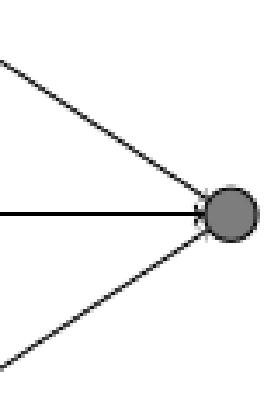
(c) Directed Biclique



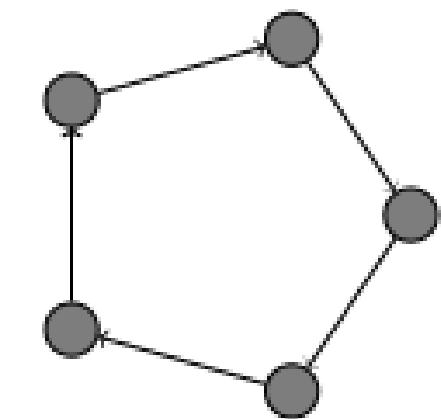
(e) Fan-in = 3



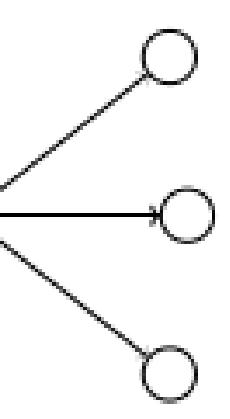
(f) Fan-out = 2



(d) Scatter-Gather



(g) Directed Cycle (5)



(h) Gather-Scatter

DATASET



IBM AML IT



Synthetic dataset generator for Money laundering

	MLDP	AMLsim	IT-AML (This Work)
Do placement?	✓		✓
Do layering?	✓	✓	✓
Do integration?	✓		✓
Model 8 key patterns?		✓	✓
Model other patterns?	✓		✓
Model multiple banks?			✓
Model multiple currencies?			✓
Complex entity graph?			✓
Model transfers, payments, credits, etc.?	Transfers only	Transfers only	✓
# of Transactions	2,340	1.32 M	180 M
Laundering rates	3/5	1/762	1/807 & 1/1,750



**THANK YOU
FOR YOUR
ATTENTION**

Any Questions?

ENHANCING GNNS

01.

Edge Updates via MLPs

02.

Reverse Message Passing

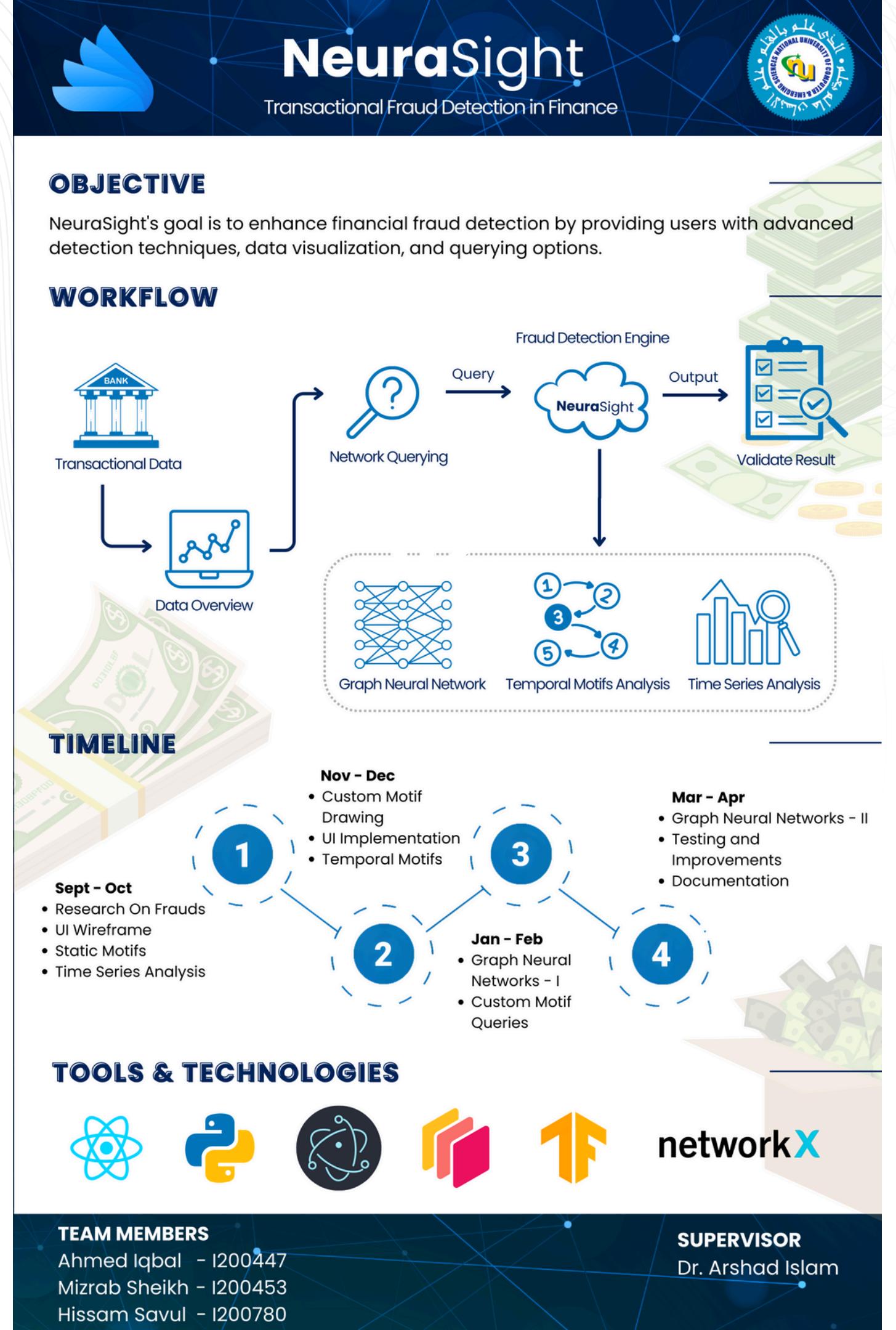
03.

Ego IDs to the Center Nodes

04.

Port Numberings for Edges

P O S T E R



The image is a detailed project overview for NeuraSight, a financial fraud detection system. It features a vertical timeline on the left and various sections on the right, all set against a background of a rocket launching.

NeuraSight
Transactional Fraud Detection in Finance

OBJECTIVE
NeuraSight's goal is to enhance financial fraud detection by providing users with advanced detection techniques, data visualization, and querying options.

WORKFLOW

```
graph LR; TD[Transactional Data] --> DO[Data Overview]; TD --> NQ[Network Querying]; NQ --> FE[Fraud Detection Engine]; FE -- Query --> NS[NeuraSight]; NS -- Output --> VR[Validate Result];
```

TIMELINE

- Sept - Oct**
 - Research On Frauds
 - UI Wireframe
 - Static Motifs
 - Time Series Analysis
- 1**
 - Custom Motif Drawing
 - UI Implementation
 - Temporal Motifs
- 2**
 - Graph Neural Networks - I
 - Custom Motif Queries
- 3**
 - Graph Neural Networks - II
 - Testing and Improvements
 - Documentation
- 4**
 - Graph Neural Networks - III
- Nov - Dec**
 - Graph Neural Networks - IV

TOOLS & TECHNOLOGIES

React.js Python TensorFlow networkX

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SUPERVISOR
Dr. Arshad Islam

PROJECT DEMONSTRATION

NeuraSight

Welcome! Here's a quick overview of the data you've uploaded.

Overview Time Series

Total Transactions

Most Transactions

Top 10 accounts with the highest number of

Jan 20, 2023 - Feb 09, 2023

Download

Most Used Currency

Amount

Top 10 accounts with the highest number of transactions in terms of amount.

NeuraSight

Empowering Banks to always stay ahead of frauds

Continue

Don't show intro screen next time.